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10/071,097	02/11/2002	Atsuko Yamaguchi	520.41158X00	1559

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ANTONELLI, TERRY, STOUT & KRAUS, LLP
1300 NORTH SEVENTEENTH STREET
SUITE 1800
ARLINGTON, VA 22209-9889

EXAMINER	
CARTER, AARON W	
ART UNIT	**PAPER NUMBER**
2625	

DATE MAILED: 03/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/071,097	YAMAGUCHI ET AL.	
	Examiner	Art Unit	
	Aaron W Carter	2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 February 2002*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *10* is/are allowed.

6)☒ Claim(s) *1-4,7-9 and 11* is/are rejected.

7)☒ Claim(s) *5 and 6* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11 February 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-4 and 7-9 are rejected under 35 U.S.C. 102(b) as being anticipated by USPN 5,805,728 to Munesada et al. ("Munesada").

As to claim 1, Munesada discloses a circuit pattern inspection method of inspecting a pattern shape on the basis of two-dimensional distribution information of intensities of secondary electrons or reflected electrons obtained by observing a pattern formed on a substrate by a scanning microscope using charged particle beam, comprising:

A step of detecting a set of edge points indicative of positions of edges of said pattern in a two –dimensional plane from said two-dimensional distribution information by a threshold method (column 5, lines 12-24 and column 6, lines 24-42);

A step of obtaining an approximation line for the set of edge points belonging to said edges detected (column 5, lines 25-29); and

A step of obtaining an edge roughness shape by calculating the difference between the set of said edge points and said approximation line (column 5, lines 30-50).

As to claim 2, please refer to the rejection of claim 1 above. The claims are identical with the exception of the additional limitation "a step of obtaining an approximation line for the set of edge points detected for each line edge by least square" which is also disclosed by Munesada in column 5, lines 25-30.

As to claim 3, Munesada discloses the circuit pattern inspection method according to claim 1, wherein a plurality of values are used as thresholds used for said threshold method (column 6, lines 24-42).

As to claim 4, Munesada discloses the circuit pattern inspection method according to claim 3, further comprising a step of calculating a spatial frequency distribution of said edge roughness shape obtained (column 5, lines 51-59).

As to claim 7, Munesada discloses a circuit pattern inspection method comprising:

A step of mounting a sample processed in a line pattern shape at a predetermined pitch on a scanning microscope, observing said sample, and obtaining a two-dimensional intensity distribution of secondary electrons or reflected electrons (column 4, line 60 – column 5, line 11);

A step of calculating a shape of roughness of an edge of said line pattern from said two-dimensional intensity distribution (column 5,lines 30-50); and

A step of storing said edge roughness shape obtained as image distortion information (column 5, lines 30-50, wherein it is inherent that in order to further process the edge roughness shape that it is stored).

As to claim 8, Munesada discloses a circuit pattern inspection method comprising:

A step of mounting a sample processed in a line pattern shape at a predetermined pitch on a scanning microscope, observing said sample, and obtaining a first two-dimensional intensity distribution of secondary electrons or reflected electrons (column 4, line 60 – column 5, lines 11);

A step of moving an observation position in the direction of a side of said line pattern only by a predetermined length and obtaining a second two-dimensional intensity distribution of secondary electrons or reflected electrons (Fig. 1, element 23 and 22 and column 5, line 60 – column 6, line 3);

A step of computing a sum of said first and second two-dimensional intensity distributions (Fig. 1, element 15 and column 8, lines 20-34);

A step of calculating a shape of roughness of an edge of said line pattern from said sum data (Fig. 1, elements 16-19 and column 8, lines 20-50); and

A step of storing said edge roughness shape obtained as image distortion information (column 8, lines 20-50, wherein it is inherent that in order to further process the edge roughness shape that it is stored).

As to claim 9, Munesada discloses the circuit pattern inspection method according to claim 8, further comprising a step of calculating an image offset amount in the direction perpendicular to an edge of a line pattern in an observation area from said image distortion information obtained and correcting a third two-dimensional intensity distribution of secondary electrons or reflected electrons obtained as a result of observing an arbitrary sample or a pattern

edge position obtained from said third two-dimensional intensity distribution (column 8, lines 35-39).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Munesada in view of USPN 6,433,348 to Abboud et al. ("Abboud").

As to claim 11, Munesada discloses a circuit pattern inspection apparatus comprising a

A charged particle source (Fig. 1, elements 2 and 3, wherein it is inherent that the microscope/image input combination uses an electron beam);

A signal processing means for obtaining an edge roughness shape and a characteristic of said pattern on the basis of a threshold method from a two-dimensional method from a two-dimensional distribution of intensities of said secondary electrons or reflected electrons obtained (column 4, line 60 – column 5, line 11 and column 5,lines 30-50).

Munesada does not disclose expressly the details of the optical system.

However, Abboud discloses a circuit pattern inspection apparatus comprising:

A charged particle source (Fig. 3, element 42);

A charged particle optical system for irradiating a sample with a charged particle beam emitted from said charged particle source through a condenser lens (Fig. 3, element 52), a

deflector (Fig. 3, element 60, "deflector"), and an object lens (Fig. 3, element 62), deflecting the beam and performing the scan with the beam;

A stage on which said sample is to be mounted (Fig. 3, element 68);

A detector for detecting intensity of a secondary electron or reflected electron emitted from said sample by irradiation of said charged particle beam (Fig. 3, element 60, "scanner"); and

A control system for controlling said deflection and scanning (Fig. 3, element 70).

Munesada & Abboud are combinable because they are from the same art of circuit pattern inspection.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use the optical system as taught by Abboud in the circuit pattern inspection system disclosed by Munesada.

The suggestion/motivation for doing so would have been to provide the sharper corners and more precisely defined lines (column 3, lines 22-23).

Therefore, it would have been obvious to combine Munesada with Abboud to obtain the invention as specified in claim 11.

Allowable Subject Matter

5. Claim 10 is allowed.

6. Claims 5 and 6 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

7. The following is an examiner's statement of reasons for allowance:

As to claim 10, none of the prior art teach or fairly suggests the limitation of selecting a candidate of a pattern forming process on said substrate as a cause of occurrence of roughness from said edge roughness shape obtained and displaying the candidate. However, Munesada discloses detecting edge points, approximating an edge line and obtaining an edge roughness shape he does not teach selecting and displaying a candidate for the cause of occurrence.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

USPN 6,839,470 to Ikeda discloses an identical invention only the effective date is not valid.

USPN 6,781,688 to Kren et al. discloses determining surface roughness.

USPN 4,750,140 to Asano et al. discloses determining surface roughness.

USPN 4,792,232 to Jobe et al. discloses determining surface roughness.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aaron W Carter whose telephone number is (703) 306-4060. The examiner can normally be reached on 7am - 3:30 am (Mon. - Fri.).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (703) 308-5246. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

awc

BHAVESH M. MEHTA
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600